Uses of Felt in Industrial Practice

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• **Orthopedic felt often can be used quite simply and with great effectiveness to relieve pain referable to positional, traumatic or inflammatory abnormalities of bone, tendon or muscle.**

Trial of protective and supportive padding with this material is particularly recommended in noninflammatory olecranon bursitis; in beginning ganglion formation; in stenosing tendovaginitis, particularly of the flexor tendons of fingers; in painful heel (subcalcaneal bursitis); and in the correction of postural deformities or imbalances.

IN THE PRACTICE of industrial medicine, orthopedic felt has come to be a most important adjunct to treatment. It is almost impossible to cover all considerations in the application of this versatile material, but a few of the most important may be dealt with here.

There are a number of disorders of the head and neck in which felt may be used effectively. Many practitioners, including orthopedic surgeons, have stressed the use of traction and Thomas collar-type splints for treatment of neck strains and sprains and fractures of the cervical spine. It is apparent that some of these conditions are included in what is commonly known as "whiplash" injury of the neck. A sling made of felt provides a very comfortable and effective means of applying cervical traction. The sling is prepared by cutting a piece of ⅛-inch felt 36 inches long and 4 inches wide and splitting it longitudinally through the center between points 10 inches from either end. The strip is then placed with one split portion under the chin and the other over the occiput and the two ends joined above the head, thus forming a comfortable sling (Figure 1). A piece of venetian blind cord or rope fastened to the ends of the sling and extending over a pulley to a weight completes the apparatus and provides good traction, which can be applied with the patient sitting in a chair or reclining. If while reclining, the pulley should be attached to the bed and the head of the bed should be blocked up 10 inches for counter-traction.

Another use of felt is to form a cervical collar (Figure 2). This is prepared by cutting a piece of felt 18 to 20 inches long and 6 inches wide. The felt is cut to shape, then molded over an angle, such as that provided by the back of a chair, to make it curve to fit the neck. The collar may be held in place with an Ace elastic bandage loosely applied to prevent constriction of the throat. A space of approximately 2 inches should be maintained in front of the neck to prevent direct pressure upon the underlying laryngeal structures. This use of felt and elastic bandage makes a good, inexpensive collar that is not difficult for either the patient or the physician. It is assumed, of course, that x-ray films of the neck area will be taken in all injuries suggestive of bone damage or dislocation. If serious lesions of the bones are present, rigid splinting with a metal brace or cast or surgical manipulation may be required.

There is considerable controversy at present concerning some aspects of cervical trauma, particularly that which results in the so-called "whiplash" injury. Regardless of the difference of opinions among physicians concerning this entity, patients will give a history of neck injury and will insist upon treatment. The method of treatment described above is simple, economical and easily provided by all physicians faced with this problem.

Another important use of orthopedic felt is in the application of a figure-of-eight dressing for fractures of the clavicle. If elastic bandages are used, it is necessary to apply protective pads to keep the bandage from rolling into a rope-like mass which will irritate the tissues of the anterior borders of the axillae. This usually necessitates frequent removal of the dressing, which obviously is not consistent with obtaining the best results. The use of felt in this application is particularly important, since it can be rolled to accommodate further forward movement of the arms at the shoulder with maximum comfort (Figure 3). A similar arrangement is also needed in the application of a homemade clavicular cross. In this situation, the arm straps that hold the shoulders back must be padded to prevent constriction in the axillae. Felt is incorporated in the construction of the more modern prefabricated splints.

Sometimes a patient will complain of tenderness and pain about the medial epicondyle and will relate it to an injury to the area. Usually there is no external manifestation of an injury such as redness, discoloration or abrasion. Often the symptoms produced by repeated slight traumatic contact of the

Presented at the Forty-Sixth Annual Meeting of the Industrial Medical Association, Los Angeles, April 13, 1961.

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Submitted September 13, 1961.

epicondyle with a firm or hard object, perhaps as a result of repeated motions of the arm in certain working conditions as, for example, flicking against a hard leather belt, or the firm belt loops on Levis or contact with tools or tool holsters attached to the belt. Such injuries frequently will heal if a small piece of orthopedic felt, fabricated in doughnut shape rather than a solid pad, is applied and held firmly in place by adhesive and an elastic bandage (Figure 3).

A rather common complaint in industrial practice is of contusions of the lateral as well as the medial epicondyle. Careful examination must be made to distinguish between contusion and radiohumeral bursitis, sometimes falsely called "tennis elbow." In the case of contusion, which may also be classified as lateral epicondylitis, swelling, redness, discoloration or other evidence of direct trauma is present; with radiohumeral bursitis, rarely is there manifestation of it on physical examination, as the condition is probably caused by inflammation of the radiohumeral bursa and not by direct trauma. Epicondylitis responds favorably and rapidly to simple treatment consisting of applying heat and protecting the area with a felt doughnut. Radiohumeral bursitis will not be helped and may be aggravated by such treatment.

The use of a felt pad in treatment of olecranon bursitis, however, is of definite value (Figure 3)—but only when the disease is of non-inflammatory origin. If the bursal swelling is considerable and the sac cannot be compressed sufficiently to meet the resistance of the bony olecranon, the felt pad and elastic bandage are worn during the active working period; but if there is not much distention of the sac, wearing the pad only during sleeping hours should suffice. In either case, the use of warm compresses for 30 minutes before bedtime is recommended. Following the application of heat, the felt pad is applied over the swollen bursa, and mild pressure is maintained by the elastic bandage. To preclude constriction should the elbow inadvertently be bent during sleep, the bandage is applied with the joint in flexion. The bandage should be snug but not tight. The fact that mild pressure reduces swelling suggests an increase in the hydrostatic exchange of fluid from the sac.

An unusual use of felt is in the treatment of ganglions of the wrist, especially dorsal ganglions. The best results are obtained in the treatment of early developing ganglions as they are pushing their way up between the tendons, particularly those of the extensor carpi radialis and the extensor indicis proprius muscles. Since often there is no observable evidence of disease, the diagnosis must be made on the basis of vague, subjective complaints such as

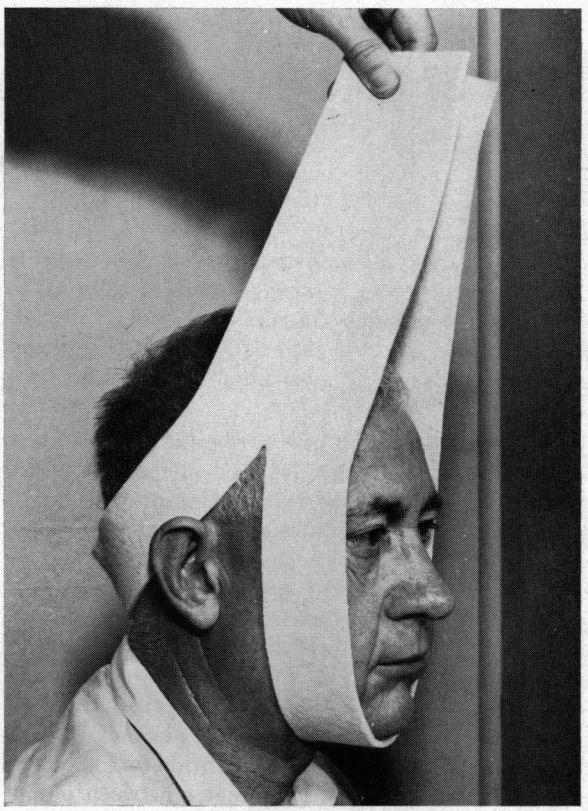

Figure 1.—Strip of felt 36 inches long with slit down the middle used as sling for application of traction to neck.

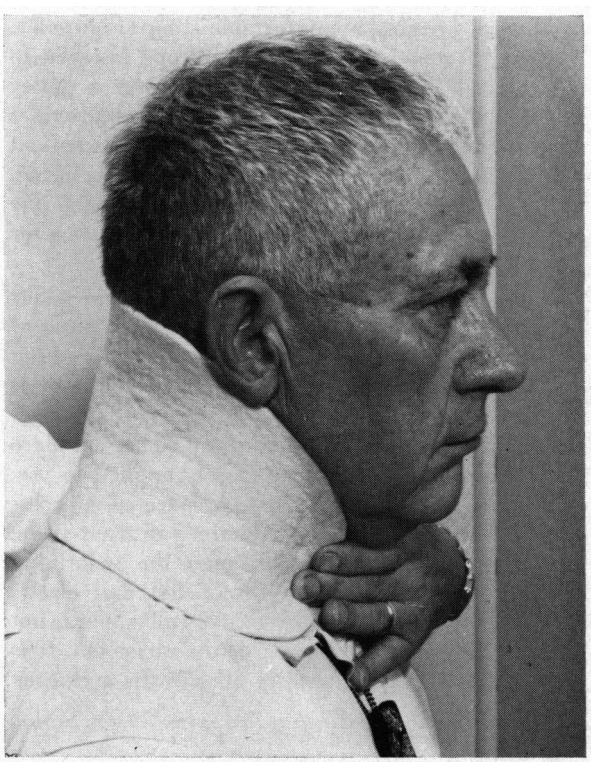

Figure 2.—Piece of felt 18 to 20 inches long and 6 inches wide, molded to form a cervical collar.

Figure 3 (left to right): Anterior shoulder pad for figure-of-eight dressing for clavicular fractures; doughnut-shaped felt pad for tender medial epicondyle; concave felt pressure pad for treatment of non-inflammatory olecranon bursitis; wedge-shaped conical pad for dorsal ganglions of the wrist; felt doughnut pad to protect hamate bone in hypothenar area.

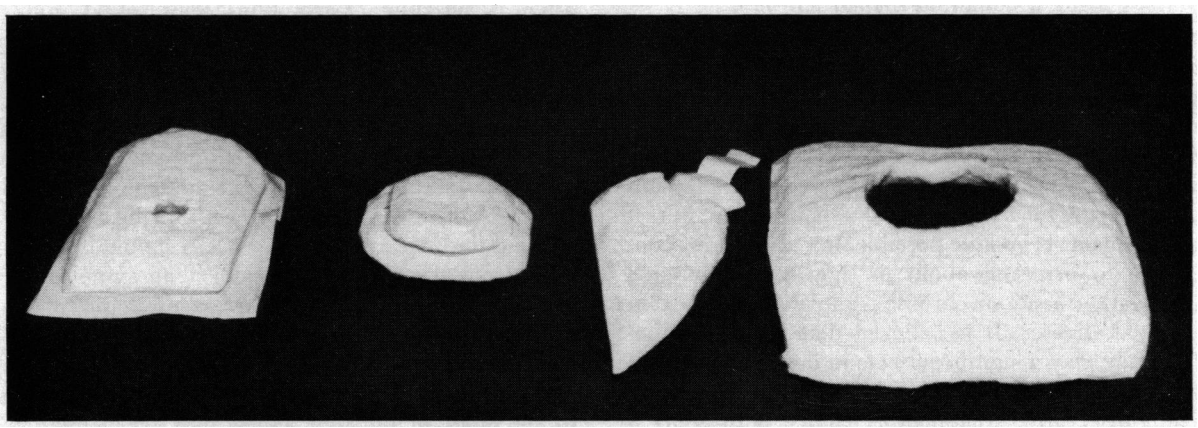

Figure 4 (left to right): Felt doughnut pad cut to cover entire heel with small hole beneath painful point of subcalcaneal bursa; pressure pad to be used over Baker's cyst covered by Ace bandage; longitudinal arch pad showing extra anterior transverse arch pad which can be added if necessary; large piano-felt doughnut with hole offset to allow for widest portion of pad to be used over suprapatellar portion of capsule.

aching in the wrist, intensified by making a fist and dorsally flexing the wrist while simultaneously applying pressure to the palm. The patient generally explains his symptoms on the basis of contusion or sprain. Due to weakness of the wrist, some degree of impairment is usually present. This condition is best treated in the following manner: A wedge-shaped pad is made by taking two pieces of ¼-inch felt and shaving them into a conical shape (Figure 3). The pieces are aproximated with ¼-inch adhesive tape. The pad is then applied between the tendons directly over the point of maximum tenderness, which can be determined by applying pressure over the pad before the dressing has been completed. The pad should be reapplied at intervals of three to four days to assure proper positioning. Altogether it should be worn for ten to fourteen days.

Not infrequently a person using the heel of his hand as a hammer will traumatize the hamate bone and adjacent tissue. The complaint will be of point tenderness deep in the hypothenar area of the hand, and there may be no external evidence of injury. A felt doughnut pad can be used to good advantage in these cases to guard against direct pressure during work, driving an automobile and other daily activities.

Another outstanding and unusual application of felt is in the treatment of stenosing tenovaginitis. This includes the "trigger" or "snapping" finger syndrome as well as DeQuervain's disease which involves the common sheath of the extensor pollicus brevis and abductor pollicus longus tendon. Both conditions are caused by a thickening of the tendon sheath. It is generally believed the conditions are secondary to chronic inflammation resulting from repeated slight traumas, but as it occasionally occurs in very young children, this belief is subject to question. The pathologic change may vary from hyperplasia of tendon elements to hyaline degeneration. The condition is seen in all stages of development

from the tender, thickened nodule on the sheath to the mature "snapping" or "trigger" finger. In my experience, cases that have not progressed to the "trigger" finger complex can generally be cured by the continual wearing of a small piano-felt doughnut held firmly in place by adhesive tape or gauze dressing. This protection prevents further irritation and allows the tendon sheath to revert to its normal unthickened and unswollen state. Once the trigger phenomenon has developed or pain is experienced on active flexion of the tendon, more intensive treatment, consisting of splinting of the moving joints plus use of the felt doughnut, is necessary for recovery. For DeQuervain's disease, a relatively long period of immobilization of the thumb in a fully extended position is necessary. With use of either a commercial splint or plaster of paris, care must be taken to prevent pressure on the point of tenderness by using a doughnut-shaped felt pad.

Pain in the heel is another condition commonly dealt with in industrial practice. It is usually caused by subcalcaneal bursitis. The retroachilleal and retrocalcaneal bursae are less frequently involved. A spur is occasionally present on the plantar surface of the calcaneus, but pain may be present even without the spur, for the problem is usually one of bursal involvement. It is quite possible that a spur may contribute to bringing about or aggravating bursitis when either acute or chronic trauma has come from postural stresses. It is believed that faulty metabolism may play a significant role in precipitating bursitis in this area as well as elsewhere in the body. The conservative treatment of choice is to apply a felt doughnut pad to the inside of the shoe under the heel so that pressure on the bursa may be avoided (Figure 4). The pad is most comfortable when cut to cover the entire heel surface with only a small hole beneath the painful point. This requires considerable skill, for if the hole is not the right size or is not in the right place the condition may be aggravated. It is helpful therefore to locate the point of maximum tenderness and paint it with a bright dye. The edges of the felt heel and the upper hole are beveled for maximum comfort and desirable fit. The hole should be about half again as big as the area of tenderness. The patient should be instructed to wear this foot-protection until bedtime and not to walk in bare or stockinged feet or soft-soled shoes. Unless he follows these instructions, the expected benefit will not materialize.

Felt can be used very satisfactorily as anterior transverse or longitudinal arch pads in shoes to provide proper support to the feet and additional length for the legs (Figure 4). Symptoms in almost any location of the back and lower extremities that are attributable to posture difficulties can be helped by this simple procedure. Occasionally, symptoms due to a slight shortening of one extremity can be relieved by elevating the corresponding longitudinal arch, although in some cases it is necessary to elevate the foot further by adding various thicknesses of leather to the outside heel of the shoe. If adding supports to the shoe results in alleviation of symptoms, the patient must be instructed not to forego the support between the end of the work-day and bedtime, lest the good that is done be undone in the six to eight evening hours.

Felt shoe pads may be used effectively for relief of a variety of symptoms. They were used at first in treatment of conditions involving impairment of motion of the back. Later it was found they could sometimes be helpful in dealing with some conditions of the lower extremities. Acute distress referable to the sacro-iliac or the lumbosacral joint is easily diagnosed but chronic pain in the lower back often is puzzling. X-ray films may reveal minor changes such as Schmorl's nodules, slight narrowing of the lumbosacral space, minor osteoarthritic deposits and sacralization of the fifth lumbar vertebra. Of much greater roentgenological importance is evidence of lumbar scoliosis, abnormalities of the vertebral facets, rotation of the lumbar spine and elevation of one iliac crest. If any of the more significant findings are present the legs should be measured from the anterior superior iliac spine to the internal malleolus, and if there is pronounced disparity the level of defect should be determined. It may be found to be in the hip area, in an asymmetrical pelvis or in the neck of the femur. Old fractures of the shaft of the long bones may be elicited by questioning.

Next the postural attitude of the ankle joints is inspected. With the patient bearing weight equally on both feet, examination is made for valgus attitude. A mild degree of leg shortening can be corrected with the application of a simple pad to the shoe with elevation of the longitudinal arch. If the defect is great, the heel of the shoe may be gradually increased in height by adding leather lifts, but not more than one-fourth inch at a time. This simple treatment, which is believed to relieve chronic tugging on the back structures due to abnormal, unequal weight-bearing, often greatly alleviates vague aches and pains in the lower back.

Not infrequently, a patient will complain of a dull, aching pain over the medial aspect of the knee, not ascribable to trauma. If the condition is of long duration, the cause is probably not in the knee. Possibly it is referable to a very flat foot. If so, quite often a properly placed supportive pad will bring about rapid recovery. The pad must be worn permanently to prevent recurrence. Baker's cyst must always be considered in any case of pain in the knee. The usual site is the popliteal area. A double felt

pad (Figure 4) may be used as a therapeutic test and occasionally will bring about cure of symptoms.

There is one additional condition of the knee which may be helped by the use of a felt pad. A sprain of the knee will usually result in some degree of effusion into the joint capsule. This has a splinting effect, apparently a way the body has of limiting activity of the joint, and for that reason relieving the situation too soon might delay healing. However, if effusion is excessive the stretching of the capsule causes pain, and aspiration is necessary for relief. In cases with moderate effusion, the application of a felt doughnut pad to the knee frequently shortens the total treatment time. Applied with a hole fitting over the patella, the major portion of the pad should be made to lie over the suprapatellar bursa or the superior extension of the capsule. Adhesive strips and an Ace bandage are applied over the entire pad to hold it in place, the hole over the patella being left uncovered, however, for better flexion of the knee. The patient is advised to remove this dressing at bedtime and apply warm compresses for 20 to 30 minutes to encourage dilatation of local blood vessels, then to reapply the pad and bandage. This treatment, which alters the hydrostatic pressure within the synovial sac, promotes an exchange of fluid.

Complaints of pain in the anterior portion of the foot are common in industrial practice, the patient ascribing it to sprain or to trauma from a falling object. There may be a swelling and pinkish reaction over the heads of the second and third metatarsals. The color of the inflammation provides the diagnostic clue, as it is fairly typical of metatarsalgia. Proper application of a piano-felt pad to the foot itself just behind the anterior transverse arch will quickly confirm the diagnosis, as the condition subsides rapidly with this treatment.

Other disorders of the foot, such as bursitis, soft and hard corns and any condition resulting in shifts in weight-bearing to avoid pain can cause symptoms in the lower extremities and back. Application of felt in these conditions can provide an amazing degree of relief.

As is well known, felt is used over many and varied prominences when applying plaster casts. This precludes pressure necrosis of the skin and abnormal pressure over a nerve. In the application of casts to the foot, it is wise to apply a felt pad to the longitudinal arch to maintain its integrity and speed recovery after cast removal. This simple precaution prevents excessive relaxation of the arch.

The most important areas to consider in the use of felt before the application of casts are the posterior surface of the pelvis, the iliac crest and the trochanter of the femur. These pressure points should be well-protected by a large circular piece of felt which encircles the whole pelvis. Care should also be taken to prevent excessive pressure over the proximal end of the fibula lest the peroneal nerve be injured. In the lower extremities the Achilles tendon and the heel area are the most sensitive points. When applying casts to upper extremities the medial epicondyle, olecranon and the styloid of the ulna should all be well protected.

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